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THE CAUSE OF DEATH

IN THE

STILL-BORN.



L A I  
To Joseph Lister Esq. F.R.S.  
with Respects  
Richard King

# THE CAUSE OF 'DEATH'

IN THE

## STILL-BORN.

BY

DR. KING, M.D.

"When I first began practice, I followed the old doctrines in *pre-ternatural presentations*, although I did not like them, yet dared not broach new ones, till I got myself settled in life; *I lost the child in almost all cases.*"—WILLIAM HUNTER.

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## PREFACE.

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TWENTY-FIVE years of public and private practice as an Accoucheur, have enabled me to watch the different phenomena which presented themselves to my mind, under nearly the same set of circumstances, and more than ten years\* have elapsed since I doubted the supposed cause of death in the preternatural still-born child in which the ablest accoucheurs of the day had implicit belief. I am now able to state not only from my own experience, but *from the experience of several members of my profession*, that a large amount

\* The first Edition of this Monograph bears the date of 1847.

of infant life *has been saved* by adopting the practice which I have suggested.

The re-publication of this essay, then, I trust, will not be unfavourably accepted, for the number of children still-born is *yet* considerable ;—and more especially as many of them are boys, and amongst the strongest and finest in regard to development, and that death takes place at the very moment of birth.

## INTRODUCTION.

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THE cause of death in still-born children is a subject which may be said to be almost, if not wholly, untouched by the Medical Profession, and it has no place in our Bills of Mortality. I have been able, however, by way of introduction, to glean a few facts to show that the subject is worthy of attention.

The still-births to the births in percentages are, in

|                             |   |   |   |      |
|-----------------------------|---|---|---|------|
| Canton de Vaud, Switzerland | . | . | . | 14·2 |
| Bloomsbury, London          | . | . | . | 10·4 |
| Strasbourg                  | . | . | . | 8·3  |
| Stockholm                   | . | . | . | 7·6  |
| Dublin                      | . | . | . | 6·7  |
| Hamburg                     | . | . | . | 6·6  |
| Iceland                     | . | . | . | 6·4  |
| Amsterdam                   | . | . | . | 5·9  |
| Edinburgh                   | . | . | . | 5·6  |
| Guy's Hospital              | . | . | . | 5·5  |
| Paris                       | . | . | . | 5·2  |
| Berlin                      | . | . | . | 5·2  |

|         |   |   |   |   |   |   |     |
|---------|---|---|---|---|---|---|-----|
| Dresden | . | . | . | . | . | . | 5·2 |
| Prussia | . | . | . | . | . | . | 4·7 |
| London  | . | . | . | . | . | . | 4·1 |
| Denmark | . | . | . | . | . | . | 4·0 |
| Vienna  | . | . | . | . | . | . | 4·0 |
| Hanover | . | . | . | . | . | . | 3·8 |
| Sweden  | . | . | . | . | . | . | 2·5 |
| Finland | . | . | . | . | . | . | 2·4 |

The preternatural births to the births,  
in per centages, are, in

|        |   |   |   |   |   |   |     |
|--------|---|---|---|---|---|---|-----|
| Dublin | . | . | . | . | . | . | 3·0 |
| London | . | . | . | . | . | . | 2·3 |

The still-births to the respective preter-  
natural births, in per centages, are, in

## LONDON.

|                 |   |   |   |   |   |      |
|-----------------|---|---|---|---|---|------|
| Upper Extremity | . | . | . | . | . | 66·6 |
| Umbilical Cord  | . | . | . | . | . | 58·3 |
| Breech          | . | . | . | . | . | 50·8 |
| Feet            | . | . | . | . | . | 50·1 |

## DUBLIN.

|                 |   |   |   |   |   |      |
|-----------------|---|---|---|---|---|------|
| Umbilical Cord  | . | . | . | . | . | 75·2 |
| Upper Extremity | . | . | . | . | . | 50·0 |
| Feet            | . | . | . | . | . | 48·8 |
| Breech          | . | . | . | . | . | 30·1 |

The male still-births to the female still-  
births, in per centages, are, in

|        |   |   |   |   |   |      |
|--------|---|---|---|---|---|------|
| Berlin | . | . | . | . | . | 42·0 |
| London | . | . | . | . | . | 40·0 |

|            |   |   |   |   |   |   |       |
|------------|---|---|---|---|---|---|-------|
| Halle      | . | . | . | . | . | . | 40·0  |
| Prussia    | . | . | . | . | . | . | 35·0  |
| Wurtemberg | . | . | . | . | . | . | 27·0  |
| Geneva     | . | . | . | . | . | . | 25·0  |
| Paris      | . | . | . | . | . | . | 22·0  |
| Dublin     | . | . | . | . | . | . | 22·0  |
| Amsterdam  | . | . | . | . | . | . | 20·0* |

Of 214 deaths in child-birth in the Dublin Lying-in Hospital, there were of

|                     |   |             |                         |
|---------------------|---|-------------|-------------------------|
| Living children     | . | .           | 76 males to 73 females. |
| Still-born children | . | 50 „ 15 „ † |                         |

The male infant to the female infant is in excess in

|                |   |   |   |                        |
|----------------|---|---|---|------------------------|
| Length of body | . | . | . | $\frac{1}{2}$ an inch. |
| Weight of body | . | . | . | 9 ounces.              |
| Area of head   | . | . | . | 1 square inch.         |

Among the number of children born in the Prussian dominions during the year 1838, there were

Births . . . 566,339 ; still-births, 21,233 ;

or one still-birth to twenty-seven births. In some provinces, however, the proportion is different. For instance, in Silesia,

\* “Abstract of the Medical Sciences,” by Dr. Ranking.

† “Philosophical Transactions for 1786,” p. 349.

|                      |          |                      |
|----------------------|----------|----------------------|
| Oppeln, births . . . | 38,140 ; | still-births, 1011 ; |
| Leignitz . . .       | 31,634 ; | „ 1740 ;             |

or one still-birth to thirty-eight births in the former, and one to eighteen in the latter place.

Leignitz it appears had, in proportion to the number of births, more than double the number of still-births, although the institutions and means of nursing and delivering women are not inferior to those in the district of Oppeln. In the Rhine province there is an equally remarkable difference between two districts immediately adjoining, and similar in many respects.

|                           |          |                   |
|---------------------------|----------|-------------------|
| Aix-la-Chapelle, births . | 14,044 ; | still-births, 449 |
| Cologne . . . „ .         | 17,556 ; | „ 954 ;           |

or one still-birth to thirty-one births in the former, and one to eighteen in the latter place; that is, the number of children still-born was in such a rate that, for an equal number of births, Aix-la-Chapelle had only three children born lifeless, while Cologne had five.

The smallest proportionate number of still-born children occurred, and nearly in the same degree, in two districts of the kingdom far distant from each other, and totally dissimilar in habits and character,

|                       |                            |
|-----------------------|----------------------------|
| Munster, births . . . | 13,276 ; still-births, 325 |
| Bromberg „ . . .      | 17,611 ; „ 434             |

In each district, therefore, there was one still-birth to nearly forty-one births.

“It is clear,” remark the authorities in their official report to His Majesty the King of Prussia, from which these statistics are taken, “that even in districts where above ten thousand births take place annually, nothing less than the experience of a considerable number of years can furnish certain data for forming a judgment as to the causes of these differences.”

It is generally understood in this country by those who have paid attention to still-born children, although their observations have not been reduced to figures, that in different parts of the same country, and even in different parishes of the same

city, there is a very marked difference in the rate of mortality.

In the parish of Bloomsbury, for instance, the still-births to the births are as high as ten per cent., although for the whole metropolis they are only four per cent., and in Guy's Hospital, the mortality in presentations of the breech is higher than those of the feet, which is generally the reverse.

If I am not greatly mistaken, the cause of these marked differences will be found in the accoucheur departments of the several divisions of the country or city, and afford the means of testing the amount of intelligence which is brought to bear upon obstetric science.

The facts I have recorded cannot fail to call serious attention to the mortality in still-born children, and to show that the subject is one of considerable research ; so much so, indeed, as to bear treating under two heads, the natural and the preternatural still-born child, or, in other words, the still-birth head first, and the still-birth feet first.

Berlin and Dresden\* offer a productive field to the young accoucheur. In the preternatural still-born child, or still-birth feet first, the legs afford so firm a hold that the neck of the infant has often been dislocated, and the head even separated from the body without the attendant being aware that anything extraordinary was in progress.

In the head presentation, on the contrary, if nature refuses her work, it is impossible for the hand to grasp it on account of its bulk, and the only resource is the use of instruments, which must necessarily be made known to the patient and attendant, and if unskilfully handled, will at once be apparent. A value is thus put upon the operator, and the risk is consequently thrown into the hands of a limited few, who by this means become expert and valuable accoucheurs.

\* Instruments for the extraction of the head are used in

|                 |   |   |   |              |     |
|-----------------|---|---|---|--------------|-----|
| Berlin, once in | . | . | . | (deliveries) | 7   |
| Dresden „       | . | . | . | „            | 14  |
| Paris „         | . | . | . | „            | 269 |
| Dublin „        | . | . | . | „            | 684 |
| London „        | . | . | . | „            | 724 |



# THE CAUSE OF DEATH

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## STILL-BORN.

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THE observations of Mr. Dalrymple\* prove satisfactorily that the after-birth, as the connecting link between the mother and her unborn infant is called, is made up of innumerable subdivisions of the umbilical cord, terminating in beautifully coiled and convoluted capillaries, which form tufts or *bouquets* of vessels, in intimate relation with the blood-vessels of the *uterus*—vessels rich in arterial blood, and well adapted to impart a sufficient amount of arterialization for healthy growth.

\* Since the first edition was published, Mr. Dalrymple is *no more*. He was *indeed* one of the most distinguished ornaments of the Medical Profession.

With this simple statement of a subject which has called forth the talent of the best accoucheurs of several ages, I at once proceed to solve the question which I have raised for myself—

The Cause of Death in the Still-born.

The usual mode of investigating such a subject is to select, for experiment, a few animals, such as the dog, the rabbit, or the guinea-pig; but I have preferred to be a gleaner in this field of science, and I have built no forced conclusions upon the fruits of my labour.

A laborious teacher and writer has expressed an opinion, that the after-birth is not detached from the uterus before “the entire birth of the infant,” \* in the face of the remark of Mr. Abernethy, that “an infant does not grope its way into the world, and get through just as a chimney-sweeper gets out of a chimney, by any efforts of its own; it is expelled, and the uterus must be perfectly contracted when it is expelled.”

\* “A Practiseal Treatise on Midwifery,” by Samuel Ashwell, 8vo. London, 1828, p. 423.

The conclusion to be arrived at from this quotation is, that the uterus, by its contraction, expels first the infant, then the after-birth, and thus diminishes in size in proportion to its loss; long, therefore, before the entire birth of the infant, the after-birth must be detached from its walls. Further, it is an admitted fact that the uterus contracts from above to below, commencing above or at the fundus, as it is termed.

It is, then, important to ascertain not only the period of detachment, but the seat of attachment. Naegelè and Montgomery have proved, by statistical data, that the attachment of the after-birth is no longer to be sought at the fundus of the uterus, but at its walls. The observations of Naegelè embrace six hundred cases, and those of Montgomery one hundred. In seven only of the former was the seat of the after-birth found at the fundus of the uterus, and in three only of the latter; and a digest, which I have just made, of forty-one Cæsarean operations, tends to establish the views of these observers. The wisdom

of this arrangement is so apparent, that it is difficult to account for the recentness of its discovery, and the apathy still existing on the subject among accoucheurs; for if it were situated at the fundus or neck of the uterus, it would be much sooner detached than at its walls.

The effect upon mother and infant when the neck is the seat of attachment has been fully discussed, but not so when the fundus of the uterus forms its bed. An attachment here would be as fatal to the infant as that to the neck of the uterus would be to both mother and infant; the cause is different, but the effect is similar, the result being one death instead of two. Nature never would, aye and more, never could, under ordinary circumstances, have implanted it where the contraction of the uterus commences, and thus at the very outset of labour placed the life of the child in jeopardy.

It will be convenient, then, to speak in future of the natural and preternatural seats of the after-birth, the former term being used to describe its attachment

to the walls, and the latter either to the neck or fundus of the uterus. When naturally seated, the first stage of delivery will affect the condition of the after-birth in a very slight degree; but the second stage, from the loss of the *waters*, will subject its *bouquets* of vessels to separation from the uterus; and the third stage will threaten its separation altogether, with a rapidity proportionate to that of the delivery; but whenever the separation of the after-birth takes place, it will have previously been at its *maximum of contraction*, and subsequently at its *maximum of expansion*, or in other words, of small and large capacity for receiving blood.

It is admitted by the best observers, that the moment the after-birth is detached the life of the infant is in danger, and sometimes that of the mother, yet the precise moment of detachment has not hitherto been sought. We must start, then, with a theory. Let us consider the uterus as a mere inverted elastic oval bag, containing an infant floating in water. The loss of the water will necessarily induce a contrac-

tion of the bag, the expulsion of the head, and subsequently of the shoulders and breech of the infant, further contraction, and so to the completion of the delivery. And if we reverse the course of delivery, as nature sometimes reverses it, and suppose the first loss to be the feet, next the breech, and afterwards the shoulders, it is obvious that the after-birth will be similarly affected.

If we consider the contraction which must necessarily ensue on these several losses of volume to the contents of the uterus, it is evident there is a period when the after-birth will no longer have attachment; and that period must be before the "entire birth of the infant;" for it has to be borne in mind that the uterus is the *contractile*, and the after-birth the *non-contractile* body.

The question then suggests itself, whether the after-birth can have attachment to the uterus after it has so far contracted as to have expelled the head of the infant, or, its equivalent in bulk, the feet? To assist us in the answer, there is the fact,

that in the natural birth the attachment is no longer necessary, air having entered the lungs, and the new and independent life having begun. The cases which occurred to Dr. Collins can scarcely be accounted for, except on the supposition that when the head of the child is born the attachment of the after-birth no longer exists. "Generally speaking, no assistance whatever should be given," in a natural delivery, observes Dr. Collins; "yet I have known several instances where the infant was lost by adhering strictly to this rule, where uterine action was tardy in returning, after having expelled the head."\*

This loss of life is clearly attributable to the separation of the after-birth before delivery, and should induce us to complete the birth of the infant the instant the head is expelled; a practice I have adopted for the last twenty years with complete success. I know of no reason to justify our incurring any longer the risk of losing the

\* "A Practical Treatise on Midwifery," by Robert Collins, M.D., p. 5.

infant between the birth of the head and shoulders.

“I am aware,” writes Dr. Ryan, the able writer on Medical Jurisprudence, “that Dr. Beck employed all his argumentative powers against the probability of an infant, whose head was expelled, and who had respired, losing its life during delivery;\* but his countryman, Dr. Hossaek, has recorded a case in point, and there is another in the ‘Medical and Physical Journal,’ vol. 43.”†

Uniformity in detachment of the after-birth will help to explain why footlings should more frequently be still-born than children of breech presentation,‡ and the latter than those of natural birth; the duration of life in these several presentations is in exact proportion to the amount of loss the uterus has sustained, compared with the time which elapses from the supposed period of the detachment of the

\* “Elements of Medical Jurisprudence,” by Theodrie Romeyn Beck, M.D.

† “A Manual of Medical Jurisprudence,” by Michael Ryan, M.D., p. 300.

‡ Blundell’s “Principles and Practice of Midwifery,” p. 77.

after-birth to the birth of the infant. To my mind this evidence is conclusive that when the feet, the equivalent in bulk of the head, are expelled the detachment of the after-birth commences, and from that moment the infant's life begins to ebb, for it cannot put on the new life by taking in atmospheric air as in the natural presentation.

Let us now consider the state of the uterus and after-birth when the body of the infant has been expelled feet first, and the head alone remains. "In all cases," Dr. Denman observes, "in which the infant is expelled or extracted by the breech or inferior extremities, the after-birth is usually managed without difficulty or danger, and it is generally, though not always, excluded more easily, and in a shorter time, than after a natural birth."\* It is surely right to infer that in these cases the detachment took place before the completion of the birth.

In a note to the seventh edition of Dr. Denman's Introduction to Midwifery Dr. Waller observes, that "the after-birth in

\* "Denman's Introduction to Midwifery," 7th Ed. p. 344.

presentations of the breech or inferior extremities is frequently expelled from its attachment to the uterus before the head of the infant is expelled;”\* and Dr. Burns remarks, that “in breech cases the after-birth is sometimes speedily detached from the uterus before the delivery is effected.”† To contend then for the attachment of the after-birth to the walls of the uterus when the head only is retained would be idle in the extreme, and *now*, not *minutes*, but *parts of minutes* are of the most vital importance in dealing with a difficult manipulation.

The accoucheur anticipates, when the after-birth is detached before delivery takes place, that the death of the infant will sooner or later be the consequence. “With the separation of the after-birth,” observes Dr. Waller, “there is of course a cessation of its function, and the infant’s life is placed in great jeopardy, unless the atmospheric air has access to its lungs.”‡

\* “Denman,” 7th Ed., edited by Dr. Waller, p. 344.

† “The Principles of Midwifery,” by John Burns, M.D., 9th Ed., p. 413.

‡ “Denman’s Introduction to Midwifery,” edited by Dr. Waller, 7th Ed., p. 344.

“An extensive detachment of the after-birth,” writes Dr. Campbell, “is destructive of infant life.”\* Yet the actual duration of its life in the uterus under such circumstances is altogether a problem which he is unprepared to solve. A *résumé*, therefore, of what has been written by others in regard to the life of the infant, in the process of birth in preternatural delivery, will next be worthy of our attention.

Dr. Merriman considers “the danger to the infant, in presentations of the inferior extremities, to arise principally from the compression of the umbilical cord between its own head and the body of the mother.”† “Should there be any considerable obstruction to the getting away of the head, the infant is destroyed,” in the opinion of Dr. Collins,‡ “by pressure on the umbilical cord, as every practitioner is aware, as

\* “Introduction to the Study and Practice of Midwifery,” by Wm. Campbell, M.D., p. 84.

† “Synopsis of Difficult Parturition,” by Dr. Merriman, p. 73.

‡ “A Practical Treatise of Midwifery,” by Dr. Collins, pp. 43 and 342.

surely as if after its birth we were to prevent its respiration."

"The wish to extract the head of the infant speedily," observes Dr. Denman, "is founded on the apprehension justly entertained that in this position the life of the infant is in the most imminent danger from the compression of the umbilical cord." \* "Injurious pressure on the umbilical cord is," according to Dr. Campbell, "destructive of infant life."† Dr. Ashwell considers "the early delivery of the head of vital importance, as between it and the pelvis the umbilical cord may suffer fatal compression." ‡

"The comparative danger of all preterm deliveries," observes Dr. David D. Davis, "is in a great measure imputable to the fact of the head being the part last born, from which arises the obvious liabi-

\* "Denman's Introduction to Midwifery," 7th Ed. p. 359.

† "Introduction to the Study and Practice of Midwifery," by Wm. Campbell, M.D., p. 84.

‡ "Practical Treatise on Parturition," by Dr. Ashwell, p. 348.

lity of the umbilical cord to fatal pressure during the abduction of the head.” \*

“ When the umbilical cord is compressed, unless the infant be promptly abstracted, it will probably die suffocated, much in the same manner as if, after delivery, it were to be wrapped up in a blanket, or thrown into water,” † says Dr. Blundell; and Dr. Ramsbotham ‡ and Dr. W. Hunter call attention to the pressure of the umbilical cord, which places the infant “ in great danger of strangulation,” and Dr. Burns, § “ lest it suffer fatal compression:” “ The consequence of compression of the umbilical cord,” in the opinion of Dr. Lee, “ is the death of the infant before its expulsion by a process similar in all respects to *asphyxia* after birth.” ||

Then as to the duration of infant life

\* “ Principles and Practice of Obstetric Medicine,” by David D. Davis, p. 835.

† “ Blundell’s Principles and Practice of Midwifery,” p. 133.

‡ “ Principles and Practice of Obstetric Medicine and Surgery,” by Dr. Ramsbotham, p. 404.

§ “ Principles of Midwifery,” by Dr. Burns, p. 413.

|| “ Lectures on the Theory and Practice of Midwifery,” by Robert Lee, M.D., p. 352.

under these circumstances, the accoucheurs up to this time agree as to the rapid death of the infant; and one and all implicitly believe that death arises from pressure on the umbilical cord, as I shall now show.

“Compression of the umbilical cord will *quickly* destroy the life of the child.”\*

“Of the causes of suspended animation pressure on the umbilical cord is by far the most dangerous; for cases frequently occur where the head is much compressed for many hours without any material injury to the infant; but where, had the umbilical cord been similarly situated merely for *a few minutes*, the death of the infant would be certain.”†

“Let the umbilical cord sustain a sufficient amount of pressure to interrupt the circulation in it but for *a few minutes*, and the infant will inevitably be still-born.”‡ “If the head remain long after the body is born,

\* “A Practical Treatise on Parturition,” by Dr. Ashwell, p. 351.

† “Introduction to the Study and Practice of Midwifery,” by Wm. Campbell, M.D., p. 564.

‡ “Principles and Practice of Obstetric Medicine,” by David D. Davis, p. 838.

the compression upon the umbilical cord will be so great, as *speedily* to cause the infant's death."\* "Pressure upon the umbilical cord for a *very short time* will in some cases kill the infant."† "If the circulation in the umbilical cord be arrested for *a few seconds* only in some infants, they cannot be made to breathe after birth."‡ Every writer since the time of Denman could be quoted to the same effect.

If a doubt had existed in my mind that I was labouring in an unexplored field, these quotations would have dispelled that doubt. In a question of life and death of two human beings, at a period the most eventful and interesting—at a season of expected joy and congratulation—we have hitherto been contented to leave to a loose presumption the amount of endurance and risk to which the mother and infant are to be subjected.

\* "Synopsis of Difficult Parturition," by Dr. Merriman, p. 78.

† "Lectures on the Theory and Practice of Midwifery," by Robert Lee, M.D., p. 334.

‡ *Ibidem*, p. 352.

Since it is not known, then, how long the infant lives in its dependent, unborn state, it is incumbent upon us to inquire into the probable duration of its life, by reference to experiments with the lower animals. The late Dr. Edwards, a distinguished member of the French Institute, and Founder of the Ethnological Society of Paris, has long since furnished us with the means of approximating to the truth in his work "On the Influence of Physical Agents on Life." The experiments of Buffon and Legallois led to Dr. Edwards' inquiries. I quote from Dr. Hodgkin's learned translation of this work of acknowledged high merit.\*

A large parturient bitch was compelled by Buffon to bring forth her offspring under warm water; at the expiration of half an hour they were taken out, and all found alive; after breathing for half an hour, they were plunged into milk for half an hour; and even a third time they were

\* "On the Influence of Physical Agents on Life," by W. F. Edwards, M.D. Translated from the French, by Dr. Hodgkin, pp. 85—90.

so subjected, yet they lived and thrived. Legallois made a similar observation on rabbits, and he extended his experiments so far, as to gather the result that this capacity of asphyxiated life diminishes as the adolescence of the animal proceeds.

Dr. Edwards, pursuing these researches, found that some animals, such as the guinea-pig, from the very commencement of life, enjoy but a very limited degree of this privilege; hence he concludes that those animals which in the immature state possess the highest faculty of generating heat, are those least capable of sustaining the privation of air, and *vice versâ*.

To determine the influence of external temperature on the duration of life during asphyxia in warm-blooded animals, kittens a day or two old were placed in water at different temperatures. At 32° Fahr. they lived four minutes and thirty-three seconds, taking the mean of nine experiments; at 50° ten minutes and twenty-three seconds; at 68° it increased considerably, being on an average thirty-eight minutes and forty-five seconds. At 86° a retrograde course

commenced, as they lived but twenty-nine minutes; lastly, at  $104^{\circ}$  they lived ten minutes and twenty-three seconds.

There are, therefore, two principal conditions which influence the life of warm-blooded animals deprived of air; first, the quantity of heat developed by the animals themselves, and, secondly, the external temperature to which they are exposed. In man also the power of generating heat is at the minimum in infancy, and increases with adolescence. Thus a seven months' child evolved heat equivalent to  $89^{\circ} 6'$  Fahr.; at two days old,  $94^{\circ} 55'$ ; adults,  $97^{\circ}$ .\*

If we could decide what the distinguished accoucheurs I have quoted mean by "*quickly*," "*a few minutes*," "*speedily*," "*a very short time*," &c., we should be able to ascertain if these experiments of Dr. Edwards uphold the theory, for it is but a theory, which has been handed down to us by our forefathers, and implicitly believed

\* "On the Influence of Physical Agents on Life," by W. F. Edwards, M.D. Translated from the French, by Dr. Hodgkin, pp. 85—90.

at the present moment, of the death of the infant from suffocation—the effect of pressure on the umbilical cord.

It is, in fact, impossible by these remarks as to time, that these writers can mean anything like that which the experiments above quoted show to be the period the infant lives in the uterus after the function of the after-birth is destroyed, provided that the umbilical cord be effectually compressed.

If, on the contrary, it is found to die in less than a quarter of an hour, as I am prepared with all these authorities to maintain that it will, then the theory of suffocation is no longer tenable. We must, therefore, seek for some other cause which, in the terms of our best observers, destroys life “*quickly*,” “*speedily*,” “*in a very short time*,” “*in a few minutes*,” or, as Dr. Lee observes, in some cases “*in a few seconds*.”

It will be as well, however, first, to test the grounds for the confidence which the accoucheurs have in their theory of suffocation from pressure on the umbilical cord. “We may presume,” says Dr. Blundell,

“that the infant is dead when the umbilical cord is flaccid and cold, and has been for an hour or more without pulsation.” \*

“After the expulsion of the breech,” writes Dr. Denman, “the continuance of the pulsation in the umbilical cord very satisfactorily proves that no compression of importance has taken place; the infant of course being in no danger, there is no occasion to hurry the delivery; but should the pulsation, which was at first lively and strong, gradually decline, and then altogether cease, the head must, if possible, be speedily extracted, or the infant will be inevitably lost, there being no other way of removing the compression, or of preserving its life.” †

“If pulsation continue regular or steady,” observes Dr. Burns, “the infant is not in danger from want of respiration, for the infant mode of life is continuing.” ‡

\* “Blundell’s Principles and Practice of Midwifery,” p. 133.

† “Denman’s Introduction to Midwifery,” 7th Ed., pp. 341—359.

‡ “Principles of Midwifery,” by John Burns, M.D., 9th Ed., p. 635.

Dr. J. Hall Davis lays down as a rule, "when the umbilical cord is found to pulsate feebly, or just cease to pulsate, that we should proceed without loss of time, but at the same time carefully, to deliver by the forceps."\* "As long as pulsation is to be felt in the umbilical cord," Dr. Merriman considers "the infant's life is in no immediate danger."†

In the first place these distinguished accoucheurs disagree, the majority are for delivery as soon as the pulsation in the umbilical cord ceases; and Dr. Blundell *in practice* is not particular for an hour or two, but *in principle* insists that the infant be promptly abstracted, or it will probably die suffocated, "much in the same manner as if, after delivery, it were to be wrapped up in a blanket, or thrown into water."‡

In all cases the purpose seems to be after the old adage,

"To lock the stable-door when the steed is stolen."

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\* "Lancet," for 1844, p. 408.

† "Synopsis of Difficult Parturition," by Dr. Merriman, p. 79.

‡ "Blundell's Principles and Practice of Midwifery," p. 133.

The guide for the accoucheur, we are told, is the pulsation in the umbilical cord. This is his test, whether or no the function of the after-birth is destroyed, or in other words, whether or no the infant is being strangled; the commencement of the strangulation being marked by the cessation of the pulsation in the umbilical cord. With such a guide the accoucheur proceeds, instrument in hand, to the rescue of the infant;\* or if it be a case of prolapsed umbilical cord, he manipulates for hours to save it "from compression, that the infant may not die strangulated." "It is to remove the umbilical cord," observes Dr. Merriman, "from the effect of this compression, that the assistance of the accoucheur is required."†

The ground then assumed is, that the infant dies from pressure on the umbilical cord, which causes an interruption in the

\* "Denman's Introduction to Midwifery," p. 341; Dr. J. Hall Davis, "Lancet," for 1844, p. 408.

† "Synopsis of Difficult Parturition," by Samuel Merriman, M.D., p. 93.

circulation, and thereby cuts off the connexion between it and the mother, before it is able to breathe and maintain an independent life.

In the first place, pressure on the umbilical cord will not for a considerable time stop its pulsation. I have long been in the habit of calling attention to the pulsation in the piece of umbilical cord attached to the infant while resting in the lap of the nurse, and therefore not only compressed, but tied with tape, and cut asunder. The pulsation of the umbilical cord is a test of the infant's life, but not of the absence of pressure on the umbilical cord.

Secondly, I hold that fatal compression of the umbilical cord is of very rare occurrence, and the theory of suffocation from that cause altogether unfounded and unphilosophical. The experiments of Dr. Edwards are demonstrative of a capacity to retain life far beyond that which is found in the course of practice, and every now and then cases occur which are inexplicable on the theory of suffocation from pressure on the umbilical cord.

Dr. Denman has remarked, that “when the head has been detained a considerable time, a few cases have terminated more favourably than he could have expected; and he has been agreeably surprised with the discovery of some faint signs of life, which, by the assiduous and careful use of the common means, have been improved, and the life of the child at length perfectly recovered.” \*

In the last case of prolapsed umbilical cord which came under the observation of Dr. Robert Lee, a great part of the *waters* had escaped at the commencement of labour, and a long coil of umbilical cord immediately followed; “but though,” he observes, “the labour continued for eight or ten hours, and the vessels must have been subjected to great pressure from the head in the pelvis, yet the infant was born alive by the natural efforts.”

“If the circulation in the umbilical cord,” adds Dr. Lee, “be arrested for a few seconds only in some infants, they

\* “Denman’s Introduction to Midwifery,” 7th Ed., p. 359.

cannot be made to breathe after birth; while in others, even when the blood has almost entirely ceased for some time to flow through the vessels—at least has been so feeble that it could scarcely be felt—respiration has been established readily on exposure to the air.” \*

This consideration should, I think, relieve every practitioner from the fancied necessity of finding a snug berth for the umbilical cord between the legs of the infant,† where common sense would never have placed it, while at the same time he is sleeping over the difficulty of the greater risk to the life of the infant from other causes. Even the master-mind of a Denman and the ingenuity of a Lee are incapable of unravelling these puzzles by the theory they have advocated.

\* “Lectures on the Theory and Practice of Midwifery,” by Robert Lee, M.D., p. 352.

† “Principles and Practice of Obstetric Medicine and Surgery,” by Dr. Ramsbotham, p. 400; “Blundell’s Principles and Practice of Midwifery,” p. 77; “Theory and Practice of Midwifery,” by Fleetwood Churchill, M.D., 12mo, London, 1842.

There are two ways in my opinion of accounting for the preservation of life in these cases,—attachment of the after-birth without compression of the umbilical cord, or compression of the umbilical cord without attachment of the after-birth; in other words, the infant's circulation maintained by attachment of the after-birth, as in adherent placenta, or by compression of the umbilical cord.

The condition of the after-birth and of the umbilical cord, and even of the infant itself, in relation to preternatural deliveries, has not been recorded, although hundreds of cases of presentation of the after-birth have of late been published. The following cases, then, are important. At the eight and a half month of gestation, and five minutes after death, M. Huguier performed the Cæsarean operation at the *Hôpital St. Louis*; “the child was pale and motionless, the pulsation of the heart could scarcely be felt, the child lived.” At the eight and a half month of gestation, and twelve minutes after death, M. Monrod performed the Cæsarean

operation at the *Maison d'Accouchement*. The after-birth was found to be inserted at the anterior portion of the uterus. After the section of the umbilical cord, about a pint of blood escaped from the uterine ends. The infant was pale and motionless, and the heart pulsated very feebly. It died five hours after birth.\*

Mr. J. G. Atkinson, of Romney Terrace, Westminster, performed the Cæsarean operation twenty-five minutes after death. "The after-birth was found closely adherent to the fundus of the uterus, which he divided, and from which a large quantity of blood was effused. The infant was dead, which seemed to arise from the sudden evacuation of a large quantity of blood in cutting through the after-birth."†

The cases of M. Huguier and M. Monrod are those of blanched infants, to which may be added that of Dr. J. Hall Davis, mentioned in the *Lancet* for 1845, page 94, and those of M. Monrod and Mr.

\* "Lancet" for 1829-30.

† Ditto for 1840.

Atkinson of gorged after-births. In my own practice this has long been the result of my observation.

I may mention the case of a near relative of the late Mr. Nathan Dunn, the proprietor of the Chinese Exhibition. It was her fourth delivery, but her first in this country. More than ordinary care was thought to be necessary as, while residing in America, she had been the subject of a footling which terminated in the delivery of a still-born boy, after considerable difficulty in the extraction of the head. And it happened, on the present occasion, to be a preternatural delivery, that of the breech. From the instant of the delivery of the breech to the moment of birth, the time occupied was twenty-three minutes. The after-birth was congested, and the infant, a boy, dead and blanched. And in a footling which I conducted with Mr. Wood, assistant to Mr. Chappell, of George-street, Hanover-square, there was the same result; the time occupied being twenty-nine minutes.

Acquainted as I was with the experiments of Dr. Edwards, I was at a loss to account for so speedy a death, and from that time I have sought for the cause of death of infants preternaturally still-born, by careful attention to the progress of such deliveries, the condition of the new-born infant, and of the after-birth.

Mr. Grove Berry relates a case of a shoulder presentation, in which from one pain, "aided by great voluntary efforts, protruded child, legs, feet, umbilical cord, after-birth and all, into the world. The infant, half an hour before the birth, was alive, yet the abdomen and head passed together through the pelvis. The infant was certainly not large, and the pelvis extremely well made. The uterine contractions, moreover, were violent; had their condition been otherwise, on the authority of Naegelè, the birth could not have been effected without the dismemberment of the infant; and it is certain, notwithstanding the numerous opposing authorities, that the infant, if it had con-

tinued to live, could not have been born in its then position.” \*

So relaxed a state of the infant within half an hour of its death can only be accounted for upon the supposition that it had parted with its blood, *and died the death of syncope*. If Mr. Grove Berry had directed his attention to the after-birth, he would, I have little doubt, have found it congested. Mr. Louis Parnell, a most industrious pupil of mine, at the Blenheim Street Free Dispensary, has furnished me with the following interesting case, which is in full confirmation of my views.

“ Elizabeth George, of 66, George Street, Chelsea, was confined at the full period of gestation of twin boys, the first being a natural birth. At the expiration of half an hour, the second infant presented by the feet, and owing to some difficulty in the extraetion of the head, the manipulation occupied ten minutes. “This infant was not only still-born, but exsanguine, and for several hours after it was resusci-

\* “ Medical Gazette,” for 1832-3, p. 46.

tated merely uttered a moaning sound ; the after-birth was found to be double, and that portion which nourished the second infant was eongested, while the other portion was natural.”

There can be no doubt that the suspended animation of the second infant was from syneope, the result of the engorgement of its portion of the after-birth. Of the two infants, the still-born was the most healthily developed. It will surely be allowed that the evidence which I have brought forward tends to show that the frequent death of the infant in preternatural deliveries arises from *syncope*, and not from *asphyxia* ; in faet, from *the want of compression* of the umbilical eord, and not from the *dreaded compression* of it.

The premises are these. Just before the after-birth is thrown off, it is at its *maximum of contraction*, and therefore preventing the escape of blood from the infant, and immediately afterwards at its *maximum of expansion*, or favouring the escape of blood from the infant. This is a matter of little moment in the natural

delivery, because the new life that is set up the moment the head is born encourages the new and discourages the old circulation, but it is all-important in the preternatural delivery, for it then acts as a moist sponge would act when released from the hand and placed in contact with water.

It is from this congestion in the after-birth that I believe the death of the infant occurs within the space of time at which the practice of our best accoucheurs has fixed it; "for it is almost incredible," to use the words of an able writer, "how small a loss of blood is sufficient to destroy a newly-born infant. A few drachms oozing from the umbilical cord, if the ligature has been loosely tied, has been known to cause a fatal result."\* The death-blow is therefore given before the umbilical cord is even threatened with compression.

Doctor Hodgkin, the distinguished morbid anatomist, has suggested to me, that the very rapid death of the infant in those

\* "The Principles and Practice of Obstetric Medicine and Surgery," by Francis H. Ramsbotham, M.D., p. 485.

cases in which the after-birth is congested is in part attributable to the peculiarity of the foetal circulation. He writes:—"In connexion with thy remarkable and important observations on the death of children preternaturally still-born, by which the loss of life is very clearly attributable to the exsanguine state of the foetus, where blood is accumulated in the relaxed after-birth, there are some points in the foetal circulation which deserve attention. It appears to me that they not only tend to confirm the conclusion at which thou hast arrived, but also to explain the failure which in these cases attends almost every attempt to restore the lost animation.

"It has been shown by Winslow and some other anatomists, and very lucidly developed in a paper by Edward Cock, read before the Physical Society of Guy's Hospital\* some years ago, that owing to the peculiarity of the foetal circulation, as respects the Eustachian Valve, the Foramen Ovale, and the Canalis Arteriosus, the blood reaching the heart by the Inferior Cava,

\* Doctor Hodgkin was the founder of this Society.

and consequently that of the Umbilical Vein is mainly directed to the head of the foetus. Its brain is, therefore, receiving blood of the best quality, and in the largest quantity. In the cases to which thy observations refer, the supply of blood sent to the heart by the umbilical vein is quickly and almost completely cut off.

“The case of the foetus in this state is worse than if both carotids were simultaneously tied, the supply by the vertebinals being also taken away. It has been often shown by direct experiment, that suspending the supply of blood to the brain by these four channels, for a few seconds only, is sufficient to produce immediate suspension of animation, which no means hitherto resorted to have been able to restore.

“This fact was demonstrated to me in the most striking manner by the late Sir Astley Cooper, Bart., who finding that in the rabbit the vertebinals, as well as the carotids, can be compressed with the fingers, produced almost instantaneous death by this means.

“It is obvious that the early application of a ligature to the umbilical cord must not merely prevent the accumulation of blood in the after-birth, but tend to maintain the supply of blood to the brain, and promote the course of circulation proper to extra-uterine life.”

The Medical Profession will be able to test my views, by careful attention to the duration of life in all cases of detention of the head in preternatural deliveries, to the condition of the infant as to asphyxia and syncope, to the state of the after-birth as to congestion or the reverse, and they will then be able to decide whether or not I am right in concluding, that the after-birth is separated as soon as the breech is expelled, and justified in tying the umbilical cord before the delivery of the shoulders and head, a practice I have no hesitation in recommending.

There will be no chance then of the infants' bleeding to death in a few minutes, and it will be placed, not in a state of syncope, but in a time-giving condition of asphyxia, in which the duration of life

can be calculated with a nicety, as great as analogy with the lower animals can afford ; and hence will be obtained a certain guide to the amount of risk and endurance to which the mother is to be subjected.

I am further of opinion, that in presentations of the after-birth, it will be sound practice to follow out the plan proposed of delivering it in the first instance, and instead of concluding that the life of the infant is hopeless, as the supporters of the practice have done, it will be right to take care in extracting the after-birth, that it be firmly squeezed in the palm of the hand, and not released until the umbilical cord is tied.

The advocates of the old practice of delivery by turning in placenta prævia have hitherto had the advantage of the supporters of the new practice in regard to the life of the infant. Let us see how far they would be entitled to superiority in this respect, if the umbilical cord were tied immediately upon the delivery of the after-birth.

Let us take the record of thirty-three

cases of presentation of the after-birth which occurred at Guy's Hospital, where turning was had recourse to, and which has been published in proof of the value of the old practice.\* The result was eighteen living and fifteen still-born children. Of the former the sexes were equal, and of the latter twelve were boys and three girls. The per centage proportion of male still-births over female still-births is here 25 per cent., which is far below the per centage of male still-births to female still-births from all causes, which is stated at page 3 to be 40 per cent.

The cause of this disproportion in the death of the sexes is attributable to the comparatively large size of the head of the male over that of the female, which, it will be found at page 4, to be in area one square inch; consequently, the nine living males must have had small heads, or a force must have been exerted in the delivery, to the injury of the mother.

I do not believe any unjustifiable force was exerted in the delivery of the nine

\* "Medical Gazette," for Dec. 1845, p. 1422.

boys, of the eighteen living children, especially as Guy's Hospital was the scene of the operations, where the motto of the Obstetric Professor of my day was—

“Save the woman, come what may the child.”

It is but right, therefore, to infer that the eighteen infants were upon an equality in the diameter of their heads—consequently the deliveries would be comparatively quick, and in time to save the life of the infant.

This opinion is not a mere baseless supposition, unsupported by evidence, but is drawn from certain cases recorded for totally different purposes. I must be content, however, in order to confine myself within the space to which I am determined to limit the present essay, to refer to one of Dr. Simpson's recorded cases. Dr. Simpson, who is the most powerful advocate of the new practice, if not the founder, has thus expressed himself in reference to a presentation of the after-birth : “The after-birth was expelled some minutes before the infant, without

internal hæmorrhage ; the infant was expelled by natural pains, and recovered.”\*

The delivery of the after-birth before the infant must facilitate its delivery, for to the loss of the after-birth there would be a proportionate amount of contraction of the uterus, consequently, a considerable gain of expulsive power ; and, if my views are sound, by tying the umbilical cord there would be a gain in time, and the probability of saving the boys as well as the girls. The construction, then, that I put upon the Guy's Hospital record is favourable to the practice, introduced by Dr. Simpson, and the sooner the operation of turning in presentation of the after-birth is laid aside the better, for it must be admitted by all, even by Dr. Robert Lee himself, to be, in every sense of the term, a rough practice.

Lastly, in the Cæsarean operation, especially when performed after death, our first and great aim should be to tie the umbilical cord. The following success-

\* Braithwaite's "Retrospect of Medicine," vol. xi. p. 126.

ful case, during life, is to the point. In October, 1805, M. d'Ariste, an eminent surgeon-accoucheur in the island of Martinique, performed the Cæsarean operation, during life, on a lady twenty-five years of age. The anterior wall of the uterus was laid open, and "the after-birth immediately presented itself, and was separated. The surgeon then seized the feet of the infant, and had little difficulty in completing the delivery. The infant was weak and faint for a few minutes after it was brought to light, but restored by common cordials."\*

The operation after death performed by Mr. Dawson, of Newcastle-upon-Tyne, would, in my opinion, have been equally successful if he had tied the umbilical cord as soon as he found he had cut into the after-birth. That gentleman,† in relating his case, states, "I made an incision through the anterior wall of the uterus, which laid bare the membranes, and

\* "Edinburgh Medical and Surgical Journal," vol. iv. p. 178.

† I beg the gentleman's pardon, the Premier of England, my Lord Palmerston, has declared in his place in the House of Commons, that a medical man is not a gentleman.

divided a portion of the after-birth, from which a quantity of *black blood* immediately flowed. The membranes were ruptured, and the infant was found lying with its face towards the back and left side of the mother. "It was of small size, with a *pale and flaccid skin*. The heart was acting, and there was pulsation in the umbilical cord. The action in the heart, and pulsation in the umbilical cord, continued for about twenty minutes, and then ceased. All our efforts, persevered in for a length of time, could not restore it."\*

In the Cæsarean operation performed by Doctor Hoëbeke, and the second of four Cæsarean operations performed on the same woman by M. Michaelis, at Kiel, the after-birth was removed before the infant, with complete success. The woman operated upon by Dr. Hoëbeke had arrived at the full period of gestation, and delivery had already commenced when the walls of the abdomen were divided, "the uterus opened, and the *after-birth removed*. The child presented its breech to the wound,

\* "Lancet," for Sept. 30, 1837, p. 28.

and was extracted with some difficulty, for the head was already engaged in the inlet of the pelvis. The child, however, was brought into the world strong and healthy.”\*

In M. Michaelis' operation the *waters* had escaped, and a foot distinguished before the incision was made in the abdomen. “The after-birth immediately presented itself in the wound. *This was removed*, the left arm of the child seized, and the infant itself extracted as far as the head. A contraction of the uterus soon set in, and the head followed a gentle traction. The infant, a female, seven pounds in weight, was born alive, and took the breast.”†

Dr. Sclater involved his patient in the risk of losing her life from not removing the after-birth. “The uterus,” in this case, “was cautiously incised, and the after-birth uncovered. The index and middle fingers of the left hand were then

\* “The India Journal of Medical and Physical Science,” vol. v., new series, p. 697.

† “Lancet,” for May 2, 1835, p. 145.

introduced, and the after-birth detached in its superior part. The wound of the uterus was increased to the extent of the incision of the skin; the feet of the infant were seized, and delivery performed without any further obstacle. Between the extraction of the infant and the removal of the after-birth, a large quantity of blood was lost, but the hæmorrhage was suddenly arrested by delivery.”\*

I have for some time been engaged in examining the records of cases of this description, with the view of ascertaining the cause of death, which forms a separate essay, and will shortly be published.

“In syncope,” Professor Sharpey remarks, “the face is *pale* and *bloodless*, the features sunk and contracted, and the eyes partially or entirely closed. In asphyxia, the face is livid and bloated, the lips swollen, and the eyes open.”† So marked a difference, therefore, between

\* “Half-yearly Abstract of the Medical Sciences,” by Dr. Ranking, vol. iv. p. 327.

† “Report on Asphyxia to the British Association for the Advancement of Science.”

asphyxia\* and syncope will not leave us long in doubt of the chief cause of death in still-born children."

The term *syncope* has not been recognised as yet as a cause of death in still-born children, and that of *asphyxia* has certainly been misapplied. Dr. David D. Davis has thus defined *asphyxia* in his work on the "Principles and Practice of Obstetric Medicine;" the child is *pale*, apparently *exsanguined*, *flaccid*, *immobile*, and to all appearance perfectly without sensation. M. Baudelocque says, "in *asphyxia* the infant comes into the world *exsanguine*." It is evident that either Dr. David D. Davis and M. Baudelocque have misunderstood the physical signs of asphyxia, or that they have recorded what they found to be the condition of the still-born infant, clearly that of *syncope*, and misnamed it *asphyxia*.

It is evident throughout their works that they believed in the generally prevalent theory, that the preternatural still-born

\* In using the term "Asphyxia," it must be borne in mind that I am not responsible.

infant died from pressure on the umbilical cord, which interrupted the function of the after-birth,—a function to the unborn infant analogous to that of the lungs to the adult, the unborn infant, in fact, being considered in the position of the criminal suspended to the gallows; strangulation, it will be recollected, is a term used by some obstetric writers.\* Much has been written on the treatment of still-born children, and every year has been fruitful in advocates for *artificial respiration*, the *warm bath* or the *cold douche*, the extraction of blood or the use of stimulants.

This difference of opinion, regarding the treatment to be adopted in still-born children is intelligible, when it is known that there is a difference of opinion as to the cause of death; or, more correctly speaking, when each obstetric professor has his own definition for the term *asphyxia*.

For instance, to attend solely to the *cold douche*, as recommended by some accoucheurs, to the neglect of *blood-letting*,

\* Dr. Ramsbotham and Dr. William Hunter.

can scarcely be said to be adopting the best means for saving the preternatural still-born child from *asphyxia*, and the abstraction of blood in the preternatural still-born child from *syncope* would most assuredly be the death of the infant by the very means adopted to save it.

*Apoplexy* instead of *asphyxia* is often used to denote the still-birth marked with a livid face, a term which is objectionable to some accoucheurs; and Dr. Doherty, of Dublin, is evidently doubtful if the term *asphyxia* is at all applicable to the still-born child. Dr. Doherty is the only authority I have met with in a long course of reading who has deviated from the usual routine of ascribing to the still-born child the death of *asphyxia*. When the infant presents by the feet, "it is apparent," writes Dr. Doherty, "the umbilical cord is very liable to suffer such compression, as will instantaneously put an end to the transmission of blood through it. The consequence of the circulation in the umbilical cord being suddenly annihilated must be, that the supply of blood to the

left side of the heart is at once cut off, just as if in the adult the pulmonary veins were rendered impervious, and those cavities continuing to contract, speedily empty themselves of their contents, and are then disabled from maintaining any longer the normal amount of pressure on the brain. Compression of the umbilical cord, then, may prove detrimental to the infant, from a total obliteration of its vessels, an almost instantaneous suspension of life, beginning at the heart.”\*

Dr. Doherty is in error in supposing the circulation in the infant cannot be maintained after the umbilical cord is compressed. If I had not held the very opposite opinion to Dr. Doherty upon this point, the present essay would not have been written. I have, nevertheless, great pleasure in calling attention to the labours of Dr. Doherty, whose writings are full of instruction and interest. It will be considered, under all these circumstances, not

\* “Dublin Journal of Medical Science,” for March, 1844, p. 68.

misplaced to clearly define what is meant by asphyxia and syncope, the only two conditions which I maintain are necessary to be thoroughly understood in the treatment of preternatural still-born children; not that I intend by this remark to imply that apoplexy is unknown in the new-born child.

Asphyxia is used to denote a suspension or loss of the power of respiration, a state necessarily inducing such a change in the nature of the blood as is incompatible with the continuance of life. The change takes place in the blood, which becomes wholly venous, and is incapable of maintaining the action and vitality of the brain and spinal cord, of the heart, of the voluntary muscles, and of almost every organ of the body.

Sensibility diminishes as the blood darkens, and when it has become quite dark the power of sensation is wholly abolished. The action of the heart is always greatly affected from the very first moment that an animal is brought under this condition. At first the contractions

of the heart are accelerated, which is attributed to the violent struggles of the animal, in consequence of the emotion of fear, but in a few seconds its action begins to be arrested, and it becomes rapidly less and less frequent until it ceases altogether. The muscles of respiration suffer with the heart, so that the respiratory movements, indispensable to the entrance and exit of fresh currents of air, cease. In this manner are abolished, in rapid succession, the functions both of circulation and respiration.

Whatever is capable of preventing the admission of air into the lungs, or of arresting the chemical action of the air upon the blood, is capable of producing the state of *asphyxia*; and the circumstances which are capable of arresting the chemical action of the air upon the blood are either mechanical or vital. *Mechanical* when the entrance of air into the lungs is prevented, as in hanging and drowning. *Vital* when the nervous system is at fault, causing a cessation of the respiratory movements, as in injury done to the

eighth pair of nerves or the *medulla oblongata*.

Syncope is a sudden suspension of the heart's action, accompanied by cessation of the functions of the organs of respiration, internal and external sensation, and voluntary motion; the face is pale and sunken, directly the reverse of that which obtains in *asphyxia*. The sudden suspension of the heart's action may arise from two causes,—from an impression on the brain, or from a loss of blood.

In concussion of the brain the face is pale, and the limbs are relaxed, and in death from drowning, where persons have fainted at the moment of submersion, the face is also pale and bloodless, and the features sunk and contracted. Since concussion of the brain can scarcely occur in the preternatural still-born child, and the unborn child, which can scarcely be said to have a mind, is unconscious of danger which causes persons submerged to faint, *syncope* can but arise in this class of still-births from an interruption to the due transmission of blood to the brain.

Although *syncope*, as I have shown, can but arise in the preternatural still-born child from one cause, *asphyxia* may arise from three causes, compression of the umbilical cord, the injudicious use of ergot of rye, and pressure on the detached after-birth. The first two causes of suspended life are generally admitted, but the third has yet to be recognised, and I therefore offer, in support of my views on the subject, the following case of Harriet Smart, of 25, Buckingham-place, Upper Cleveland-street, who was delivered of a footling, in a quarter of an hour from the time the feet were expelled. The after-birth came away with the head, upon which it had been hard pressed by the uterus for some time. The accoucheur feared there was serious injury done to the scalp, until the industrious use of the sponge demonstrated that it was merely the dry blood of the after-birth. The child was still-born, and in a livid state. It breathed freely in ten minutes after birth, and in three days the livid appearance was no longer perceptible.

In all cases where the infant is born weakly, or in a state of asphyxia, M. Baudelocque recommends not to cut the umbilical cord for some time at least after birth. He relates that since he has followed the opinions of Smellie, Leveret, and Chaussier on this subject, he has not lost a single case, although when born the child might be in a state of pretty complete asphyxia or apoplexy.

He states, that though a child be born in an apoplectic or asphyxiated state, the circulation still continues through the umbilical vein, even though the umbilical arteries should have ceased to beat, and that the premature section of the umbilical cord takes away one of the chief aids to its revival.\*

M. Baudelocque, from his own showing, is but practising *a mode of* abstracting blood, in which the receptacle is the after-birth instead of a basin, which if continued for an indefinite period, as in cases of detention of the head, would terminate in death

\* "Edinburgh Medical and Surgical Journal," for Oct. 1841, p. 546.

from syncope, and his practice, therefore, is highly objectionable. The manner in which M. Baudelocque accounts for the removal of the congestion in the infant can scarcely, I conceive, be accepted by the physiologist.

Into the cause and treatment of the different conditions of *asphyxia* and *syncope*, it is not necessary to inquire in the present essay, in which the preternatural still-born child is alone treated. The infant who has breathed presents several varieties of both forms of disease, which, on account of their practical importance, require a separate consideration. In *asphyxia* from drowning, hanging, and suffocation from noxious gases, the physiological condition of the system is the same, but there is a treatment suitable for each.

The terms *asphyxia* and *syncope*, as applied to the still-born child, may very well then be expressed by the words *livid* and *blanched*. This will be a sufficient index to the treatment. For the livid condition of the still-born, the important remedies are abstraction of blood and

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a *high temperature* ; for the blanched, on the contrary, the cold douche and a *low temperature*. The treatment, however, is a subject by itself. My present object is attained by having called attention to

“The Cause of Death in the Still-born.”









